USDA United States Department of Agriculture

Forest Service

Northeastern Research Station

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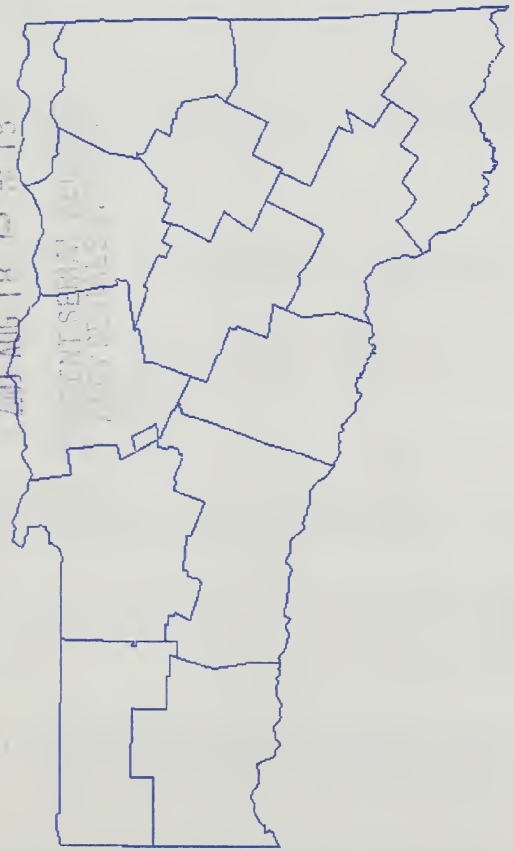
Forest Health Monitoring in Vermont

1996 - 1999



VERMONT

The National Forest Health Monitoring (FHM) program monitors the long-term status, changes and trends in the health of forest ecosystems and is conducted in cooperation with individual states.

In Vermont, 35 FHM plots were established in 1990 (Fig. 1). Each point in Figure 1 represents the status and approximate location of one FHM plot. Each plot is a set of four fixed-area circular plots. Most tree measurements are made on four 1/24-acre subplots. Seedling and sapling measurements are made on four 1/300-acre microplots, located within the subplots.

All plots were visited at least once between 1996 and 1999, and 11 to 13 plots were sampled each year. This report summarizes the most recent conditions.

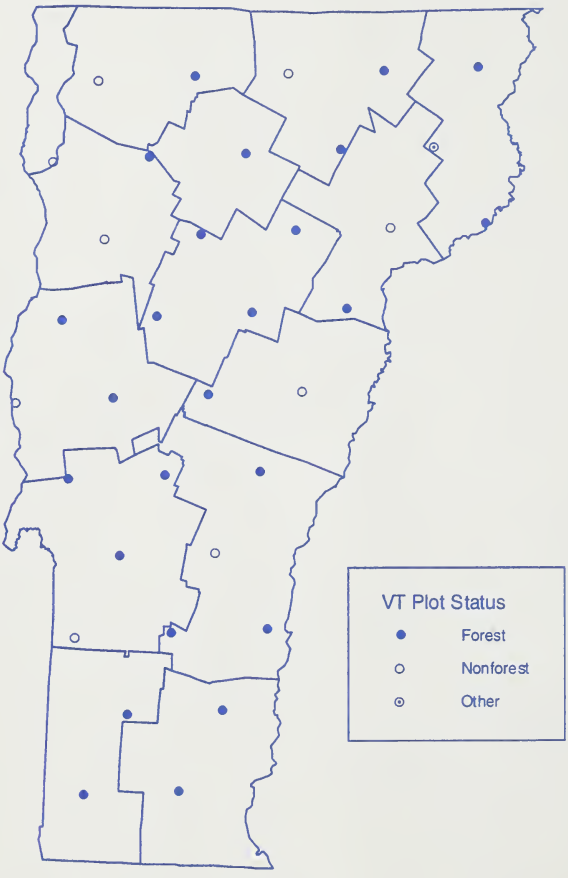


Figure 1. - Current status and approximate locations of Forest Health Monitoring (FHM) plots in Vermont.

Plot Characteristics

- 25 of the 35 plots were at least partially forested.
- 71 percent of the 35-plot area was forested.
- 44 percent of the forested areas were in maple-beech-birch forest types; the second most common type group was the white-red-jack pine forest type, accounting for about 24 percent of the forested areas. Spruce-fir forest types occurred on 20 percent of the forested areas.
- 57 percent of the forested areas were in sawtimber-size stands with 39 percent of the forested areas in poletimber-size stands.
- 48 percent of the forested areas were in stands that were more than 60 years old; 32 percent of the forested areas were in stands that were 41 to 60 years old; and 16 percent were in stands that were 21 to 40 years old.

Plot Structure (Table 1)

Seedlings

- Sugar maple seedlings (12 inches tall, less than 1 inch diameter) were most abundant, accounting for about 28 percent of the 1,212 seedlings counted.
- The five most abundant species groups collectively accounted for 68 percent of the seedlings. They were sugar maple, white and green ash, other maple, quaking aspen, and American beech.

Saplings

- Sugar maple saplings (1 to 4.9 inches d.b.h.) were the most abundant, accounting for over 18 percent of the 192 saplings counted.
- The five most abundant species groups collectively accounted for 55 percent of the saplings. They were sugar maple, American beech, red maple, white and green ash, and red spruce.

Trees

- Sugar maple trees (5 inches d.b.h. or greater) were the most abundant, accounting for 14 percent of the 822 trees counted.
- The five most common species groups collectively accounted for 52 percent of the trees. They were sugar maple, red spruce, red maple, balsam fir, and eastern hemlock.

Table 1. -- Number of trees by size, class, and species groups, Vermont, 1996-99. Rankings of species quantity appear as superscripts beside numbers.

Species	Size Class		
	Seedlings	Saplings	Trees
Balsam fir	30	12	74 [4]
Eastern hemlock	10	6	66 [5]
Red spruce	54	14 [5]	94 [2]
White/green ash	159 [2]	18 [4]	63
Quaking aspen	115 [4]	2	15
American beech	79 [5]	19 [2]	49
Sugar maple	339 [1]	35 [1]	114 [1]
Red maple	30	19 [2]	76 [3]
Other maple	138 [3]	10	5
All softwoods	112	51	341
All hardwoods	1,100	141	481
All trees	1,212	192	822

Tree Condition

Crown Dieback (Table 2; Fig. 2)

Crown dieback refers to recent mortality of branches with fine twigs and is measured as a percentage of the tree crown. Low dieback ratings (5 percent or less) are considered to be an indicator of good health. High dieback ratings indicate poor health.

- 87 percent of the trees had low dieback ratings; average dieback was 5 percent.
- 4 percent of the trees had high dieback ratings (more than 20 percent affected crown).
- 73 percent of white and green ash trees had low dieback ratings; 11 percent had high dieback ratings.

Table 2. -- Mean plot values and percentage of trees with ratings of specified values, by crown variable, Vermont, 1996-99. (plot means based on 25 forested plots; percentage of trees based on 822 live trees 5 in. or more in d.b.h.)

	Value
Crown Dieback	
Plot Mean	5.2%
Trees with ≤5% dieback	87
Foliage Transparency	
Plot Mean	18.9%
Trees with ≤30% transparency	96
Crown Density	
Plot Mean	48.1%
Trees with >30% density	86

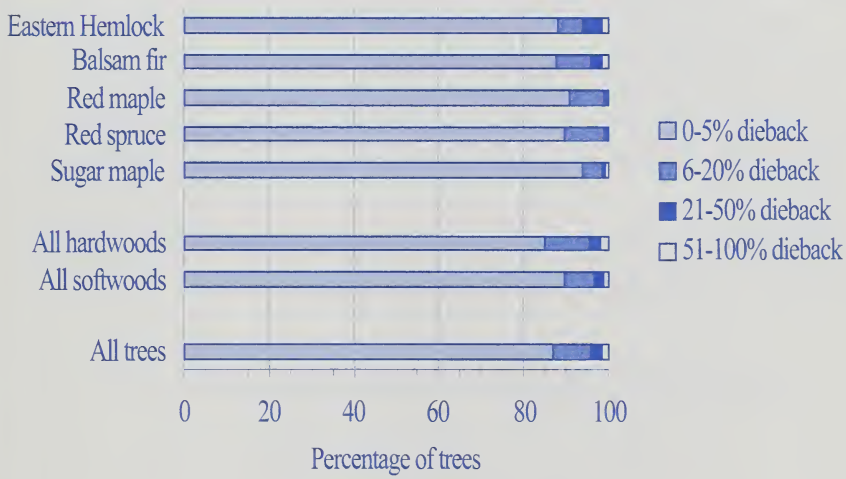


Figure 2. - Distribution of crown dieback ratings for trees in Vermont, 1996-99.

Foliage Transparency (Table 2; Fig. 3)

Foliage transparency is the amount of skylight visible through the live, normally foliated portion of the crown. Foliage transparency estimates the crown condition in relation to a typical tree for the site where it is found. Low transparency ratings (little visible skylight) indicate a full and generally healthy, crown; high transparency ratings indicate a sparse crown. Transparency ratings of 30 percent or less are considered normal for most trees.

- 96 percent of all trees and 92 percent of common species had normal transparency ratings; average transparency was 19 percent.
- 4 percent of all trees had high transparency ratings (more than 30 percent affected crown).
- 11 percent of balsam fir, 10 percent of white and green ash, and over 7 percent of eastern white pine had high transparency ratings.

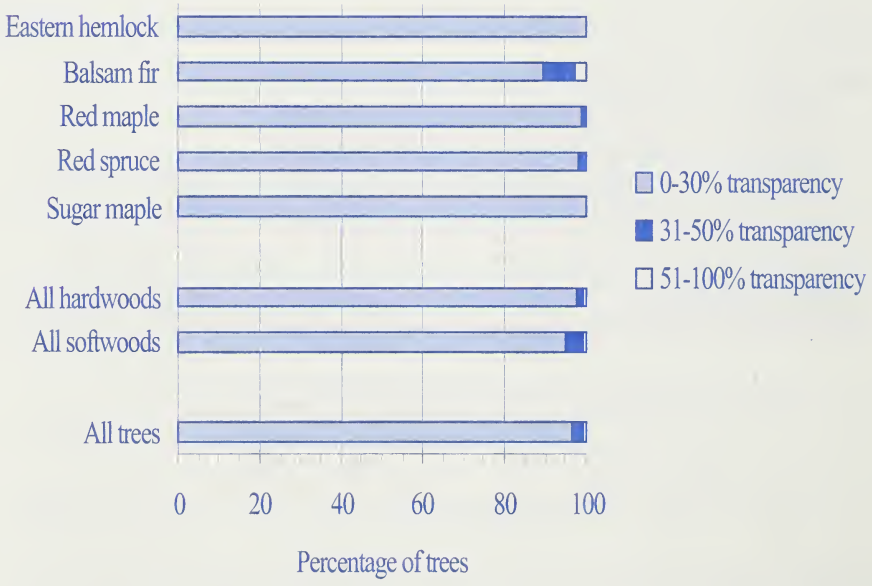


Figure 3. - Distribution of foliage transparency ratings for trees in Vermont, 1996-99.

Crown Density (Table 2; Fig. 4)

Crown density is the percentage of crown area where sunlight is blocked by crown branches, foliage, and reproductive structures. Crown density estimates crown condition relative to a typical tree for the site. Density also serves as an indicator of future growth. High density ratings (greater than 30 percent) indicate a full, healthy, crown.

- 86 percent of trees had high density ratings; average crown density was 48 percent.
- 14 percent of all trees had low crown density ratings (30 percent or less).
- Density ratings were low on 28 percent of balsam fir, and 25 percent of white and green ash.
- Crown density was high on 95 percent of paper birch and 92 percent of maples.

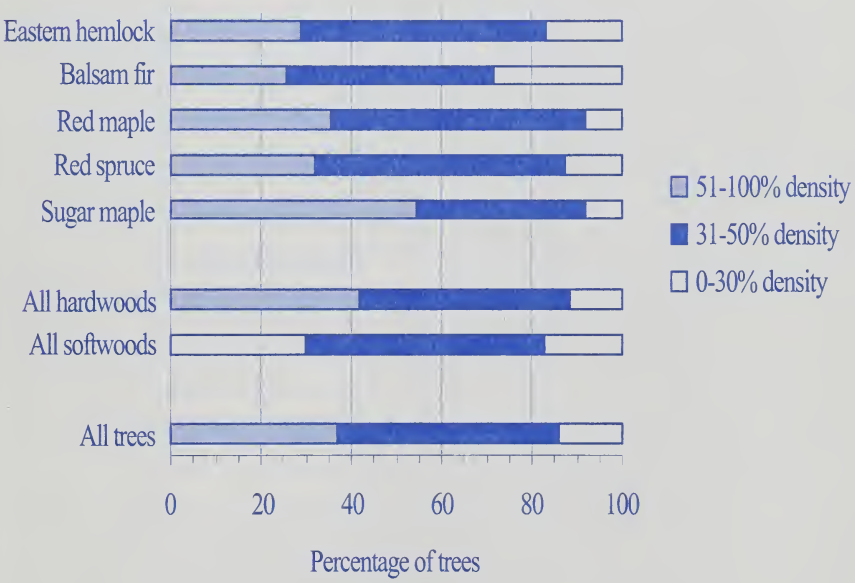


Figure 4. - Distribution of crown density ratings for trees in Vermont, 1996-99.

Tree Damage

Signs and symptoms of damage were recorded if the damage could kill the tree or affect its long-term survival. The 11 categories of damage used in this report were: cankers and galls, decay, open wounds, resinosis and gummosis, cracks and seams, vines, dead or broken tops, broken branches, other bole and root damage, other crown damage, and other damage (not otherwise defined).

- 71 percent of trees had no significant damage, 22 percent had one damage, and 7 percent of the trees had two or more damages.
- 58 percent of 297 damages were decay; 11 percent were dead or broken tops; 9 percent were open wounds; and 7 percent were dead or broken branches.
- 49 percent of American beech trees were damaged with 97 percent of the damage caused by decay.
- 42 percent of sugar and red maple were damaged. Cankers and open wounds were more common on sugar maple, and open wounds and dead and broken branches were more common on red maple.

Summary

Vermont forests vary in size and age class. Trees are distributed evenly between hardwood and softwood species but hardwood dominated the seedling sample. Most of the trees are healthy, with full crowns (low transparency, high density), little dieback and little damage. White and green ash had higher transparencies and lower crown densities possibly explained by the crown structure of ash trees. Efforts are underway to evaluate the ash resource. The high incidence of damage on American beech, predominantly decay, is likely associated with the beech bark disease complex.

For more information regarding the FHM program, contact: Chuck Barnett, Northeastern Research Station, USDA Forest Service, 11 Campus Blvd, Suite 200, Newtown Square, PA 19073; 610-557-4031; cjbarnett@fs.fed.us or visit the National FHM website: www.na.fs.fed.us/spfo/fhm

Acknowledgments

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